

ROBBERFLIES OF THE GENERA PROMACHUS AND PROCTACANTHUS.

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The species of these two genera from America north of Mexico, have been considered by Williston in Volume XII, of the Transactions of the American Entomological Society, and the Mexican species of *Promachus* have been tabulated by Osten Sacken in *Biologia*, Diptera I, 192. The fact that it has been possible to get together an extensive collection of specimens of various species from different parts of North America has led me to make an attempt to identify many of the Nearctic forms, and as some success at least has been attained the following results are offered for the consideration of those, who for any reasons, have interest in the various species included.

One can not study these flies in the field without noting their highly predaceous habits. These habits have attracted the attention of observers in the past with the result that a few of the species have been mentioned as injurious from the standpoint of killing honey-bees and other useful insects, but in most cases the feeding habits are variable to the extent that each species accepts a large variety of insect life as food, so that after all it seldom happens that their attacks are concentrated in a particular direction sufficiently to establish a marked habit which shall be considered either injurious or beneficial. They are among the largest species of their subfamily, some specimens measuring nearly forty-five millimeters in length and the smallest over twenty millimeters, so if their predaceous habits could be controlled the results, very likely, would be of extraordinary importance.

The material used in the preparation of this paper has been procured from various sources and I am under many obligations for favors. The United States National Museum and the museums of Cornell University and the University of Kansas each have loaned specimens for study. Professor J. R. Watson, of Albuquerque, New Mexico, has sent me several specimens from that interesting region; Professor J. H. Schaffner has donated the material he collected during two summers in central Kansas; Professor C. F. Baker has sent me much material that D. L. Crawford collected in Mexico during the season of 1910; while Charles Dury of Cincinnati, and H. S. Harbeck, of Philadelphia, and others have forwarded various species from

their respective localities. D. W. Coquillett, Chas. W. Johnson, J. M. Aldrich and other Dipterologists have aided in various ways. One finds it much pleasanter to work at a difficult task when he meets with such encouragement as I have had in this study.

The characters available for the separation of the species in both of these genera are rather meager and I doubt not that students will experience more or less difficulty in using the keys and descriptions. The differences which distinguish species are sufficiently evident, however, for the purpose when the proper comparisons can be made, but without the opportunity to make comparisons as is the case when a single species is considered one may not always feel satisfied with results.

I was not able to get all of the described species from Mexico and Central America but where I possessed specimens of species from these countries they are included in the consideration of their respective genera.

A list of the species and synonymy is given below but the reader is referred to Aldrich's Catalogue of North American Diptera and to other works for further references to literature.

LIST OF THE SPECIES OF PROCTACANTHUS.

arno Townsend, Proc. Cal. Acad. Sci. IV, 599.

brevipennis Wiedemann, Auss. zw., I, 431. Van der Wulp, Tijdsch. v. Ent., XXV, 108. Williston, Trans. Amer. Ent. Soc. XII, 73.

caudatus new species.

coquillettii new species.

duryi new species.

fulviventris Macquart, Dipt. Exot., Suppl. IV, 88. Osten Sacken, Catalogue 235, note.

heros Wiedemann, Auss. zw., I, 427. Schiner, Verh. Zool. Bot. Ges., 1866, 682; 1867, 396. Williston, Trans. Amer. Ent. Soc., XII, 74.

longus Wiedemann, Dipt. Exot., 183; Auss. zw., I, 426. Macquart, Hist. Natur. Dipt., I, 307; Dipt. Exot., I, 2, 123. Schiner, Verh. Zool. Bot. Ges., 1866, 682; 1867, 396.

craverii Bellardi, Saggio, II, 50. Williston, Biologia, Dipt., I, 327.

micans Schiner, Verh. Zool. Bot. Ges., 1867, 397.

milbertii Macquart, Dipt. Exot., I, 2, 124.

missouriensis Riley, 2d Mo. Report, 122, fig. 89.

pagrion Jaennicke, Neue Exot. Dipt., 57.

nigriventris Macquart, Dipt. Exot., I, 2, 124.

nigrofemoratus new species.

occidentalis new species.

philadelphicus Macquart, Dipt. Exot., I, 2, 123. Williston, Trans. Am. Ent. Soc., XII, 75.

rufiventris Macquart, Dipt. Exot., I, 2, 123, plate X, figure 2.

rufus Williston, Trans. Am. Ent. Soc., XII, 74.

Of the other North American species that have been placed in *Proctacanthus*, *exquisitus* Osten Sacken must belong to the genus *Asilus* if one may judge from the figure, for the posterior branch of the third vein meets the margin of the wing distinctly behind its apex; *P. virginianus* Van der Wulp has the appearance of a species of *Erax*. The specimen figured is a female and no spines are shown at the tip of the ovipositor; this fact, together with the presence of a stump of a vein at the base of the anterior branch of the third longitudinal suggests *Erax*, for I have never found a species of *Proctacanthus* with this character present; *Proctacanthus zamon* Townsend has been known as a synonym of *Eccritosisia amphinome* Walker for some time.

LIST OF THE SPECIES OF *PROMACHUS*.

- albifacies** Williston, Trans. Am. Ent. Soc., XII, 63. Osten Sacken, *Biologia*, Diptera, I, 195.
bastardii Macquart, Dipt. Exot., I, 2, 104.
laevinus Walker, List II, 108.
rubiginis Walker, Dipt. Saund., 123.
ultimus Walker, Dipt. Saund., 136.
philadelphicus Schiner, Verh. Zool. Bot. Ges., 1867, 389.
fitchii Osten Sacken, Catalogue, note 121, 234.
apivora Fitch, Country Gentleman, XXIV, 63; 3d N. Y. Report, 251, plate IV, figure 7.
forfex Osten Sacken, *Biologia*, Diptera, I, 194.
quadratus Bellardi, Saggio, II, 27, plate II, figure 3.
giganteus new species.
minusculus new species.
nigrans new species.
nigripes new species.
princeps Williston, Trans. Am. Ent. Soc., XII, 62.
quadratus Wiedemann, Dipt. Exot., 201; Auss. zw., I, 485. Osten Sacken, *Biologia*, Dipt., I, 192.
rufipes Fabricius, Syst. Ant., 794; Syst. Antl., 169. Wiedemann, Dipt. Exot., 203; Auss. zw. I, 487. Williston, Trans. Am. Ent. Soc., XII, 107.
sackeni new species.
truquii Bellardi, Saggio II, 80, plate II, figure 6. Williston, *Biologia*, Dipt., I, 322.
vertebratus Say, Journ. Acad. Sci. Phil., III, 47; Compl. Works, II, 62. Williston, Trans. Am. Ent. Soc. XII, 62.

Five species of *Promachus* from Mexico and Central America could not be procured so they are not considered in this paper. They are *anceps* Osten Sacken, *cinctus* Bellardi, *magnus* Bellardi, *nobilis* Osten Sacken and *pulchellus* Bellardi.

Promachus fuscipennis, according to Osten Sacken, is not a North American species and *Promachus trapezoidalis* Bellardi is rightly included in the genus *Mallophora* as Williston has stated for it has the claws distinctly blunt at the tips. It may be of interest to state that this latter species has been taken at Brownsville, Texas. Heretofore it was known only from Mexico.

THE GENUS PROCTACANTHUS.

Proctacanthus was described by Macquart in 1838. The species falling here are all rather large and robust, the marginal cell is closed, palpi one segmented, antennal bristle bare, veins closing the discal and fourth posterior cells not parallel, the posterior branch of the third vein curves forward to meet the costa before the tip of the wing, anterior branch of the third vein not angulated at base nor does it bear a stump, ovipositor cylindrical and with a terminal circllet of spines which may be very small in some species, abdomen longer than the wings. These characters are all well marked and there is no difficulty in placing the various species in the genus. The venation is much like *Erax* but the circllet of spines at the tip of the ovipositor and the lack of silver white segments at the posterior part of the male abdomen are distinctive.

KEY TO THE SPECIES OF PROCTACANTHUS.

1. Segments of the abdomen thickly pilose on the sides, very large red species. heros
 Abdomen pollinose or sparsely hairy, smaller species. 2
2. Femora black, tibiae red, the colors strongly contrasting. 3
 Femora and tibia of nearly the same color, so there is no strong contrast in colors. 4
3. From above the hypopygium is wide, and longer than segments seven and eight combined. Male abdomen largely red, female abdomen not red. caudatus
 Hypopygium small, distinctly shorter than segments seven and eight combined. Abdomen of both sexes largely red above. **fulviventris**
4. Abdomen red, except the first segment and anterior border of the second. 5
 Abdomen in large part gray pollinose. 6
5. Dorsum of the thorax uniformly brown, hypopygium from above wide, appendages longer than segments seven and eight combined. **rufus**
 Dorsum of the thorax usually striped with black, hypopygium small, the appendages from above shorter than segments seven and eight combined. **rufiventris**
6. End lamella of the ovipositor densely pilose, spines at the tip small 7
 End lamella of the ovipositor sparsely hairy and with a circllet of enlarged spines at the tip. 8
7. Wings nearly hyaline, many of the veins faintly margined with brownish. **occidentalis**
 Rather small species, middle of the wing with a large dark colored patch **coquillettii**
8. Wings hyaline or with only the veins margined with brown. 9
 Wings of a uniform brown all over. 12

9. Scutellum with white bristles.....*duroyi*
 Scutellum with black bristles.....10
10. Wings clear hyaline, all the femora entirely black.....*nigrofemoratus*
 Wings with the veins margined with brown, at least the posterior sides of
 all, the femora red.....11
11. Male genitalia elongate, the appendages curved inward at the tips and enclos-
 ing an open space beyond the other parts.....*arno*
 Male genitalia short, appendages but slightly longer than the other parts
micans
12. Thorax with brown markings, wings clear brown.....13
 Thorax with dark, nearly black, markings, wings pale brown.....14
13. Wings long and wide, palpi with white hair, two or three bristles on the
 front side of the hind femora besides those near the apex.....*longus*
 Wings rather short and narrow, palpi with black hair, four or five bristles
 on the front side of the hind tibia besides those near the apex
philadelphicus
14. Abdomen very dark, nearly black pollinose.....*nigriventris*
 Abdomen lighter, gray pollinose.....15
15. Large stout species, middorsal stripe of the thorax gray pollinose and not
 plainly differentiated.....*milbertii*
 Small, rather slender species of southern distribution, middorsal thoracic
 stripe usually plainly differentiated and not distinctly pollinose.....
brevipennis

Proctacanthus heros Wiedemann.

Total length, 32 to 45 millimeters. Body red all over, mystax and beard straw yellow, occipito-orbital bristles straw yellow; legs red with black bristles and yellow hair; bristles of the scutellum black; wings brown, some of the cells along the inner margin nearly hyaline at the middle. First four or five abdominal segments on each side with an area of dense yellow pile, hairs on the dorsum of these segments and on all parts of the posterior segments short and black.

The large size of this species together with the red color of the entire body and the pilose areas on the sides of the abdomen easily characterize it.

Specimens from Southern Pines, North Carolina, collected by A. H. Manee. Also others from Georgia and Mississippi.

Other writers have reported it from Florida, South Carolina and Kentucky.

Proctacanthus rufus Williston.

Total length 30 to 36 millimeters. Body red, with the exception of the first abdominal segment and the anterior margin of the second which are black. Mystax and beard yellow, the latter lighter than the former, palpi red with pale hair; thorax and legs mostly with dark hair and bristles, scutellum with numerous black bristles, wings nearly uniformly pale brownish, dorsum of the thorax plain red without distinct markings of any kind. Abdomen black at base above, otherwise red, the former color extends back to the anterior third of the second segment. Male genitalia enlarged, wider than the last abdominal segment, appendages from dorsal view wide at the base and narrowed towards the apex.

The red legs, uniform red thorax and enlarged hypopygium are characteristic.

Specimens are at hand from Ohio, Arkansas, Kentucky, New Mexico and Massachusetts. Others record it from North Carolina and New Jersey in addition.

The species appears to be partial to bare sandy areas such as are present along lakes, seas and rivers and in semi-arid regions. The larval and pupal stages are passed beneath the surface of the ground, and the pupa case is left partially protruding when the adult issues.

***Proctacanthus rufiventris* Macquart.**

Total length 30 to 35 millimeters. This species is very much like *rufus* in coloration. In fact the only noticeable difference between the two is to be found in the markings of the thorax and the male genitalia. In most specimens of *rufiventris* the thorax is marked with dark, nearly black stripes and spots. The hypopygium is small, narrower than the last abdominal segment and the appendages from dorsal view are narrow for their entire length, short and rounded at the tips.

Specimens at hand from Louisiana, North Carolina, and Texas. Others record it from San Domingo, Honduras, and Porto Rico.

***Proctacanthus fulviventris* Macquart.**

Total length 25 to 30 millimeters. Mystax and beard bright yellow, palpi black with yellow hair, proboscis and antennae black. Thorax black, scutellum with numerous yellow bristles and hairs; wings pale brown, femora clear black, tibiae red, except the apex of each which may be black, tarsi black or in some specimens the hind metatarsi are red. Abdomen black at the base, partly red posteriorly. Different individuals are colored differently. In two specimens before me the female abdomen is clear black except the dorsum of segments three to seven inclusive which is red, while in the male the segments beyond four are red, as is the dorsum of three and four, while the venter of the first four segments and the dorsum of the first two are practically all black. Male genitalia small, appendages much shorter than the last two abdominal segments, each widest at the base and gradually narrowed towards the apex which is rounded.

The small male genitalia together with the clear black femora and red tibia characterize the species.

The specimens before me are from Florida and records do not show that it has been collected in any other locality.

Proctacanthus caudatus n. sp.

Total length 28 to 30 millimeters. Mystax and beard pale yellow, palpi yellowish red with pale yellow hair, antennae and proboscis black; thorax dark with some light pollinose markings, bristles of thorax black, numerous but not very stout black bristles on the scutellum; femora black, tibia red, black at the apices, tarsi black; wings pale brownish. Male abdomen yellow, except first segment and the base of the second which are largely black, hypopygium from dorsal view wide, from side view widened near the apex which is obliquely truncate. Female abdomen entirely dark, except the posterior margin of each of the second to fifth segments which are red; first abdominal segment in both sexes with numerous yellow hairs on each side.

The male type and one female from Veracruz, Mexico, collected by D. L. Crawford, of Pomona College, Ontario, Cal.

The male hypopygium is very different from that of *fulviventris* or *rufus*.

In Volume I, page 206, Biol. Cent. Am. Osten Sacken mentions a female of a species of *Proctacanthus* which appears to be the same as this one. His specimen was taken at San Geronimo, Guatemala.

Proctacanthus occidentalis n. sp.

Total length 30 to 36 millimeters. A modest colored species having nearly clear wings with many of the veins narrowly margined with brown. Mystax very pale yellow, usually with a few black bristles, beard white, palpi black with some black and some white hair, occipito-orbital bristles partially white and partially black; thorax pale brownish or gray, mostly with black bristles, scutellum with numerous black bristles and scattering fine white hairs, humeral callus distinctly lighter gray than the other parts of the thorax and toward the median line from each of these is a small white spot which is of some use in determination for most other species do not have such a marking. Wings nearly hyaline, in most specimens the longitudinal veins are faintly margined with brown; femora red posteriorly and nearly black anteriorly, tibiae colored with reddish and blackish in various combinations; abdomen dark, gray pollinose, male genitalia shorter than the last two abdominal segments, appendages curved towards each other at the tips so that they nearly meet; female genitalia with the end piece densely yellowish pilose and with the spines at the tip so small that they are not plainly differentiated from the other hairs of the region.

Male type from Los Angeles County, California, and eleven other specimens from California and Idaho, mostly collected by Coquillett and Aldrich.

***Proctacanthus coquillettii* n. sp.**

Total length 25 to 27 millimeters. Mystax and beard white or very pale yellowish, palpi black with white hair, antennae dark, nearly black, third segment short, oval, arista nearly three times as long as the segment which bears it. Thorax dark, brownish gray pollinose and with black and gray hair; legs with black and gray bristles and gray hair; femora uniformly dark, nearly black, tibiae and tarsi brownish red; wing hyaline with the middle third quite distinctly brown, abdomen uniformly dark, gray pollinose and with numerous gray hairs. Male genitalia rather short, appendages and other parts margined with dense rows of gray hair. Female genitalia with the end piece densely pilose but devoid of a terminal circle of enlarged spines.

It is easily known by the brown patch on the middle of each wing, by the short third antennal segment and by the genitalia of the male. The female genitalia agree rather closely with *occidentalis* but differs from all other species by the spines at the tip being small and not plainly differentiated from others of the last segment of the ovipositor.

The female type and a male from Los Angeles, California, collected by Coquillett, for whom I am pleased to name the species.

***Proctacanthus micans* Schiner.**

Total length 26 to 36 millimeters. Mystax pale yellow, beard white, palpi black with most of the hairs with which they are clothed white, although there may be a few black ones. Occipito-orbital bristles mostly pale but in some specimens there are plenty of black ones. Thorax brown in ground color, grayish brown pollinose and with the usual dorsal markings, numerous black bristles on the posterior part with some gray hairs intermixed, anterior part with short black hairs; wings nearly hyaline with the veins quite distinctly margined with brown; legs rather dark from general view, femora dark before, brown behind, tibiae and tarsi in large part brown but somewhat variable. Abdomen dark, grayish brown pollinose; male genitalia rather small and compact, appendages scarcely protruding beyond the other parts, of nearly the same width throughout from side view and clothed with fine white hair. Female genitalia black or brown, end piece sparsely hairy and with a distinct circle of strong spines at the tip.

The small compact male genitalia and hyaline wings with brown margined veins are characteristic.

Numerous specimens from Colorado, Arizona and New Mexico.

***Proctacanthus duryi* n. sp.**

Total length 26 to 28 millimeters. Mystax pale yellow, beard and hair of the palpi nearly white, in fact all the bristles and hairs of the head are white or very pale yellowish. Whole body yellowish gray

pollinose, dorsum of the mesothorax and scutellum with pale bristles; wing clear hyaline, veins pale brown; legs rather light colored, femora darker before than behind, all parts of the legs with black bristles and pale hair. Hair and bristles of all parts of the abdomen gray. Male genitalia about as long as the last two abdominal segments, female genitalia with a circlet of strong spines at the tip.

The rather small size of the species, with the white bristles of the whole body, especially the scutellum, and the general pale color are distinctive.

Male type and numerous other specimens taken along the Ohio River in Ohio and Kentucky by Charles Dury for whom the species is named.

***Proctacanthus arno* Townsend.**

Total length 28 to 36 millimeters. Mystax white, usually with a few black bristles beneath, beard white, palpi black with black and white hairs, proboscis black, occipito-orbital bristles partly black and partly white, whole body grayish brown pollinose. Thorax with the usual markings above, mesothorax above with short black hairs anteriorly and rather stout black bristles posteriorly, scutellum with many black bristles and a few white hairs anteriorly. Legs in general color rather dark, femora nearly black before, brown behind, tibiae and tarsi somewhat variable but often quite dark so that they show no contrast with the femora; wings hyaline, usually with the veins faintly margined with brown, but in general specimens they are entirely glassy clear. Abdomen rather slender, male genitalia elongate, longer than the last two abdominal segments, appendages from side view, narrowest at the middle, slightly widened and curved inward at the tips so that from dorsal view a distinct open space is enclosed beyond the other genital parts. Female genitalia usually shining black with short white hairs, end piece rather sparsely hairy with a circlet of strong black spines at the tip.

The long male genitalia as described characterizes this species fully.

The type was collected at the southern end of Lower California. Specimens are at hand from southern Arizona, New Mexico, Utah, Palo Alto, California, and El Paso, Texas.

***Proctacanthus nigrofemoratus* n. sp.**

Total length of the male type 30 millimeters, other specimens vary from 23 to 30 millimeters. Mystax beard and hair of the palpi white; palpi, antennae and proboscis black; occipito-orbital bristles partly black and partly white. Thorax gray pollinose, mesothoracic dorsum with black hairs and bristles, scutellum with black bristles; wings hyaline with pale veins. Femora uniformly black all over, tibiae pale on the basal parts, otherwise dark, nearly black, as are all the tarsi.

Basal part of the abdomen largely dark in ground color and gray pollinose, last three segments red in ground color and gray pollinose. Male genitalia slightly shorter than the last two abdominal segments combined, rather small and compact; appendages red, from lateral view of nearly the same width throughout and rounded at the apex.

The entirely hyaline wings, the uniformly black femora and the small size of the specimens make the species easy of determination. The female genitalia shining black with a distinct circle of spines at the tip.

The male type and two other males and four females from San Jose, Mexico, collected by D. L. Crawford and McConnell.

***Proctacanthus philadelphicus* Macquart.**

Total length 28 to 36 millimeters. Mystax dark yellow, usually with some black bristles intermixed, beard slightly paler than the mystax, palpi black and mostly with black hairs; occipito-orbital bristles part black and part yellow. Thorax rusty brown pollinose, mesothoracic dorsum with short black hairs anteriorly and with black bristles and hairs posteriorly, scutellum with numerous black bristles and hairs and often with a few white hairs intermixed. Legs in most part brown with black bristles and pale hairs, femora darkest anteriorly, wings uniformly brown all over. Abdomen rusty brown pollinose. Male genitalia slightly shorter than the last two abdominal segments combined, appendages brown, from side view nearly straight and near the same width throughout, the tips rounded but not curved towards each other. Female genitalia shining black, end piece rather broad, sparsely hairy and with a circle of strong black spines.

The intense brown color of the body and wings and the dark yellow mystax are characteristic of the species.

Specimens from New Jersey, Maryland, Connecticut, Massachusetts, Virginia and Pennsylvania.

***Proctacanthus longus* Wiedemann.**

Total length 32 to 36 millimeters. Mystax yellow, beard paler than the mystax, palpi black with paler hairs, occipito-orbital bristles part black and part pale. Thorax brown, gray pollinose, mesothoracic dorsum with the usual markings rather plainly shown, anterior part mostly with short black hairs, posterior part with black bristles, scutellum with black bristles and hairs; legs brown with black bristles and numerous pale hairs; tibiae slightly lighter than the femora; wings uniformly brown, wide and rather long. Abdomen brown, brownish gray pollinose, male genitalia shorter than the last two abdominal segments combined, from side view appendages nearly straight, of nearly uniform width with the tips rounded but not curved toward each other when viewed from above; female genitalia black with a terminal circle of strong spines.

Related to *philadelphicus* but the pale hairs of the palpi, long, wide wings and more grayish pollinosity of the body serve to characterize it.

Proctacanthus craverii Bellardi reported from Mexico, from the description, I take to be a synonym.

Specimens at hand from Georgia, Florida and Texas.

***Proctacanthus milbertii* Macquart**

Total length 28 to 40 millimeters. Mystax pale yellow, beard paler than the mystax, palpi black with black hair. Thorax gray pollinose, mesothoracic dorsum with the usual markings rather plainly shown, scutellum with black bristles and usually with a few pale hairs; wings uniformly light brown; legs brown, tibiae and tarsi lighter than the femora which are darker anteriorly than behind. Abdomen gray or in some cases brownish gray pollinose. Male genitalia shorter than the last two abdominal segments combined, appendages not curved toward each other at the tips; ovipositor usually black but occasionally red or partly red, with a circlet of strong spines at the tip.

Related to *philadelphicus*, but the mystax and wings are paler; the abdomen is gray and not brown pollinose and the thoracic markings are rather more distinct.

Specimens from western Ohio, Indiana, Wisconsin, Kansas, Missouri, Michigan, Colorado, California and British Columbia. It is one of our most common and widely distributed species.

Under the name *Asilus missouriensis*, Riley has written of this species as a distinct enemy of bees.

***Proctacanthus nigriventris* Macquart.**

Total length 30 to 35 millimeters. Body very dark, nearly black; wings uniformly rather pale brown. Mystax very pale yellowish, often with black bristles intermixed, beard gray, occipito-orbital bristles black. Thorax dark, brown pollinose, mesothoracic dorsum with black hair and bristles, usual markings not plainly differentiated; scutellum with black hairs and bristles. Wings uniformly rather pale brown, legs dark nearly black; femora, except the apices, black, apexes of femora, tibiae and tarsi dark brown. Abdomen dark, nearly black, dark pollinose with a narrow band before each incisure light pollinose, venter and sides of the last two or three segments in the male gray pollinose; male genitalia dark red, rather short, appendages widest at the base, gradually narrowed toward apex where they are evenly rounded; ovipositor shining black with strong black spines at the tip.

The very dark color of the whole body is distinctive.

Specimens from New Jersey, collected by H. S. Harbeck, of Philadelphia.

Proctacanthus brevipennis Wiedemann.

Total length 20 to 28 millimeters. *Mystax* usually white but sometimes yellowish and occasionally largely black, in any case there is likely to be more or less black bristles mixed with the others, beard white, palpi with black hair, occipito-orbital bristles mostly black. Thorax brown, gray pollinose, mesothoracic dorsum with the usual markings very plainly differentiated, anterior part with short black hairs, posterior part with numerous black bristles; scutellum with black bristles and a few white hairs before. Wings uniformly pale brownish; legs brown, tibia and tarsi lighter than the femora, which are nearly black before and brown behind. Abdomen rather dark colored, more or less gray pollinose, male genitalia red, rather short, small, of nearly the same width throughout and evenly rounded at the tips. Ovipositor shining black, except occasionally when it is more or less red, with a distinct circlet of spines at the tip.

The small size and plainly differentiated thoracic markings are usually sufficient to place specimens of this species.

Specimens at hand from North Carolina, Kansas, New Jersey, Florida, and Georgia. The type of the species was taken in Kentucky.

THE GENUS PROMACHUS.

In 1838 Macquart described the genus *Trupanea* to receive the species which fall here. Ten years later Loew discovered that Macquart's name could not stand on account of previous usage and proposed *Promachus* to take its place. The species are large, although somewhat smaller than the species of *Proctacanthus*. The bristles of the antennae are naked, the veins closing the discal and fourth posterior cells are not parallel, the posterior branch of the third vein terminates beyond the tip of the wing, there are three submarginal cells and the abdomen is longer than the wings. These characters will place the species easily in most cases but certain species of *Mallophora* may cause trouble. In case they do the fact that the members of the latter genus have obtuse claws, while those falling under *Promachus* have pointed claws should obviate the difficulty. There are at least nineteen valid species of the genus described from North America, but since five of these from Mexico and Central America could not be procured only fourteen are treated in this paper. The genus appears to reach its greatest development to the southward and I have reasons for believing that there are yet in North America several undescribed species.

KEY TO THE SPECIES OF PROMACHUS.

1. First submarginal cell with a gray shadow which sometimes is very narrow. . 2
 First submarginal cell without any trace of a gray shadow. 12
2. Male genitalia with dense silvery hair above, color of the tibiae very near like that of the femora. 6
 Male genitalia without silvery hair above, color of the tibiae usually in striking contrast to that of the femora. 3
3. Gray bands on the dorsum of the abdomen fully as wide as the black bands. . 4
 Gray bands on the dorsum of the abdomen confined to narrow posterior borders of the segments. 5
4. Thorax deep reddish brown, male genitalia clothed with black hair. . *rufipes*
 Thorax yellowish gray, male genitalia clothed with gray hair. . . *vertebratus*
5. Gray shadow in the first submarginal cell less than half as wide as the cell; male genitalia rounded at apex. *sackenii*
 Gray shadow in the first submarginal cell darker in color than usual, distinctly more than half as wide as the cell; male genitalia truncate at apex *forfex*
6. Abdomen with black hair on some or all of the first five segments above. . 9
 Abdomen without black hair on any of the segments above. 7
7. Abdomen uniformly clothed with short gray hair, mystax very pale yellow or nearly white, beard white. *truquii*
 Abdomen clothed with yellow hair, beard and mystax distinctly yellow. . . 8
8. Gray shadow in the first submarginal cell wider than the marginal cell, male genitalia almost as long as abdominal segments five, six and seven combined. *fitchii*
 Gray shadow in the first submarginal cell distinctly narrower than the marginal cell, male genitalia shorter than abdominal segments six and seven combined. *quadratus*
9. Mystax white or with a very slight shade of yellowish, legs chiefly black. . 10
 Mystax plainly yellow, legs chiefly yellowish red. 11
10. Abdomen densely brown pollinose on the sides. *albifacies*
 Abdomen gray pollinose on the sides and extending across narrowly on the hind margins of the segments. *princeps*
11. Abdomen densely brown pollinose on the venter and sides, wings plainly brownish. *bastardii*
 Abdomen pale yellowish gray pollinose on the venter and sides, wings nearly hyaline. *quadratus*
12. Legs pure black. 13
 Legs more or less reddish. 14
13. Abdomen distinctly banded with black and gray, the gray bands slightly more than half as wide as the black. *nigripes*
 Abdomen not distinctly banded, although the narrow posterior margins of the segments are somewhat different from the other parts by appearing whiter. *aldrichii*
14. Very large species, 35 to 40 millimeters in length. *giganteus*
 Small species, not over 25 millimeters in length. *minusculus*

Promachus vertebratus Say.

Total length 26 to 31 millimeters. Front and face clothed with yellow pollen, hairs and bristles of the whole head yellowish, beard paler than the mystax, often some of the bristles on various parts of the head are black but there does not appear to be any uniformity as to which ones are black and often there are none of this color. Proboscis shining black, palpi clothed with yellowish hair with an intermixture of black in some specimens, antennae black. Thorax yellowish pollinose, dorsum with a brown stripe at the middle divided by a narrow gray line, wings dilute brownish; legs somewhat variable in color, clothed with black bristles and recumbent pale hair, femora in large part black although they may be almost entirely reddish, or even only

reddish in part; tibiae reddish with the extreme apices darker; all of the tarsi brown or black. Abdomen largely gray pollinose and clothed with pale hairs; dorsally the first six segments each have a rectangular black marking which occupies about the anterior half of its respective segment. Male genitalia black, clothed with pale hair, female genitalia shining black.

Specimens from Kansas, Wisconsin, Illinois and Ohio.

***Promachus rufipes* Fabricius.**

Total length 28 to 35 millimeters. This is a larger species than *vertebratus*. The color of the thorax is much browner than in that species and the color of the wings is more pronounced. The palpi are black with black hair and the hypopygium is shining black with scattering black hairs. The legs are somewhat variable, or at least in the specimens before me they show two distinct types of coloration. The specimens that agree closer to the original description have pure black femora and reddish yellow tibiae with black apices. In another set of specimens the femora and tibiae, except the apices, are reddish brown throughout and do not show any contrast. In other respects the two series of specimens exactly agree and I prefer to consider them all *rufipes*.

Specimens at hand from District of Columbia, Tennessee, Mississippi, Iowa and Ohio.

***Promachus sackeni* n. sp.**

I take this to be *Promachus* No. 2, *Biolog. Cent. Am.*, Volume I, page 193.

Total length 22 to 27 millimeters. *Mystax* composed of black and yellow bristles intermixed, palpi black, mostly with black hairs but there may be light colored ones intermixed, especially on the basal parts, beard white, thorax gray pollinose above with the usual markings, wings uniformly pale brownish, the dark marking in the first submarginal cell very little more than one-fourth as wide as the cell at the widest part, femora, apex of the tibiae and the tarsi black with black bristles, remainder of the tibiae yellowish red with numerous pale hairs and a few black bristles, claws pointed and distinctly curved. Abdomen with much yellowish hair which on the sides is rather long; segments two to seven in the male and two to five in the female with gray pollinose triangles on the sides, the inner angles on each side meeting above on each of segments two to five in both sexes and forming a posterior gray band; the hypotenuse of each triangle is slightly concave, leaving on each segment a semicircular spot which is clear black; hypopygium black, slightly wider than the abdomen, evenly rounded posteriorly, with mostly black hairs dorsally and pale yellow hairs laterally; ovipositor black, somewhat longer than abdominal segments four and five.

Three males and three females from southern Arizona, in July and August, some of them collected by the late Dr. F. H. Snow.

Osten Sacken's specimens were procured in northern Sonora, Mexico, by Morrison. In a note after his description he mentioned *Promachus trapezoidalis* Bellardi as closely related, but Williston has shown, rightly I think, that the latter belongs to *Mallophora*. I have seen a male of this from Brownsville, Texas. Bellardi mentions the blunt claws and Williston calls attention to the same character.

Promachus forfex Osten Sacken.

This is a new name for *Promachus quadratus* Bellardi, since there is an older *quadratus* by Wiedemann.

Total length 23 to 30 millimeters. Mystax largely composed of yellow hair, but a few of the finer ones are black, antennae and proboscis black, palpi with black hair, occipito-orbital bristles black. Thorax sparsely gray pollinose with the usual darker markings dorsally, scutellum with two more or less irregular rows of black bristles and numerous shorter yellow hairs; wings uniformly yellowish brown, distinctly darker than in sackeni, cloud in the first submarginal cell two-thirds as wide as the cell, dark colored and with a distinct outline; femora, tips of the tibiae and tarsi, including the claws pure black, remainder of tibiae and pulvilli yellow, balancers pale yellow; abdomen largely clothed with light yellow hair, sides and narrow posterior margins of the first five segments in the female and seven in the male gray pollinose leaving a large quadrate dark marking above on each of the segments. Ovipositor composed of three segments, shining black; hypopygium black with black hair, from dorsal view gradually widened toward the apex where it is plainly truncate.

Male and female from Cordoba and a female from Veracruz in Mexico, collected by D. L. Crawford. Also a female from Puerto Barrios, Guatemala, collected by E. B. Williamson. The species appears to be southern in distribution and is not likely to be taken in the United States.

Promachus fitchii Osten Sacken.

Fitch described this species under the name *apivora* because he found it injurious to bees. His name could not stand, however, as it had been used before in the genus.

Total length 25 to 30 millimeters. Mystax, beard and hairs of the palpi distinctly yellow, occipito-orbital bristles pale yellow intermixed with black ones which are more numerous in some specimens than in others. Thorax yellowish brown pollinose above with short black

hairs anteriorly and longer black hairs and bristles posteriorly, a tuft of yellowish hairs before the scutellum in well preserved specimens, scutellum with numerous yellow hairs and a few black bristles; legs mostly yellowish red although usually there is a black or blackish area on the front side of each femur; hairs of the legs yellow, bristles black; wings with a pale brownish tinge, shadow in the first submarginal cell plainly evident, a little more than a third of the width of the cell at the widest part, ground color of the abdomen black, uniformly clothed with rather short yellow hairs all over.

The long hypopygium is clearly distinctive in this species. It is nearly twice as long as in any other species I have seen.

Numerous specimens from Clay County, Kansas, collected by Prof. J. H. Schaffner. Aldrich catalogues it from Nebraska, Missouri, Kansas, Connecticut and Florida.

***Promachus albifacies* Williston.**

Total length 22 to 28 millimeters. Mystax and beard white, at most only a few black hairs on the oral margin; palpi with many black hairs and usually with some scattering white ones among them; rear of the head with white hairs and a few black bristles above. Thorax brown pollinose with the usual stripes above, a tuft of white pile in front of the scutellum largely surrounded by black bristles, scutellum with numerous white hairs and black bristles; wings nearly hyaline, gray shadow in the first submarginal cell less than one-third as wide as the cell at the widest point; legs largely black but somewhat variable, often the femora are red posteriorly and the same may be said of each tibia at base. Abdomen pure black in ground color, distinctly brown pollinose on the venter and sides and on each side of each segment are numerous white hairs which tend to reach across the dorsum and form a very narrow hind border to the segment. Hypopygium small, short and clothed above with abundance of silver white pile.

The species is known from California, Colorado, Arizona, New Mexico and Mexico.

***Promachus princeps* Williston.**

Total length 27 to 32 millimeters. Mystax white with a few black bristly hairs on the oral margin, beard white, palpi with numerous black hairs and a few white ones, rear of the head with white hair and some black bristles above; thorax gray pollinose, wings hyaline, gray shadow in the first submarginal cell very narrow and usually not sharply defined, legs approaching black, each femur posteriorly and each tibia at the base more or less dark reddish; abdomen black in ground color, gray pollinose on the sides and venter, with an area of white hairs on each side of each segment and these tend to approach each other and unite and thus form a band across the posterior margin of the segment. The abdomen is somewhat variable when different specimens are compared on account of the area covered with white hair.

This species may be separated from *albifacies* by the gray instead of brown pollinosity of the thorax, and sides and venter of the abdomen, by the wings being more nearly hyaline and by the gray shadow in the first submarginal cell being narrower and less sharply defined than in that species.

The species is known from California, Oregon and Washington.

***Promachus bastardii* Macquart.**

Asilus laevinus, *Trupinea rubiginis* and *Asilus ultimus* of Walker, and *Promachus philadelphicus* Schiner are considered synonyms.

Total length 21 to 28 millimeters. *Mystax* and beard yellow, the latter paler than the former, palpi clothed with black hair, occipito-orbital bristles black; thorax brown, the usual markings present on the dorsum but not very plainly shown, legs in general color red with white hair and black bristles; in most specimens there is a black stripe of greater or less width on the anterior side of each femur, and the front legs especially may have more or less yellow pile on the tibiae and tarsi; wings quite distinctly uniformly brownish, shadow in the first submarginal cell about half as wide as the cell at the widest part, not very dark gray but with definite limits. Abdomen distinctly brown on the venter and sides and clear black above. From dorsal view the abdomen shows a very narrow band of white hair on the posterior margin of each segment and black hairs on a clear black background otherwise.

The hypopygium is clothed with silvery white hair above but is distinctly wider than in *albifacies* and *princeps*.

Specimens have been taken in New York, Massachusetts, Pennsylvania, Michigan, Kansas, Georgia and Ohio.

***Promachus quadratus* Wiedemann.**

Total length 22 to 29 millimeters. *Mystax* and beard yellow, the latter distinctly lighter than the former, palpi black with yellow hair, but with a few black ones intermixed, rear of the head with yellowish hair, occipito-orbital bristles black. Thorax light brown pollinose with the usual middorsal stripe and lateral markings; wings very pale yellowish all over, shadow in the first submarginal cell narrow, hardly one-fourth as wide as the cell at the widest place; legs brown with light hair and black bristles, anterior part of each femur darker than the other parts of the leg; balancers brown. From above each abdominal segment has a rather wide posterior margin which is clothed with pale yellowish or white hair and which widens distinctly towards each side. The ground color of the abdomen is black and the color shows plainly on the anterior part of each segment but not so extensively as in *bastardii*. In the male the genitalia is of medium size and clothed above with silver white hair as in related species.

There has been some uncertainty in regard to *quadratus* but these specimens agree well with the original description. In comparison with *bastardii* the color as a whole is lighter, the palpi are clothed with mostly yellow hair instead of mostly black hair, the wings are much nearer hyaline, the gray shadow in the first submarginal cell is much narrower and the abdomen has much more light hair. Weidemann's type is recorded as from Georgia.

Specimens are at hand from Cameron Parish, Louisiana.

***Promachus truquii* Bellardi.**

Total length 24 to 36 millimeters. Mystax pale yellowish, beard white, rear of the head with white hair, occipito-orbital bristles mostly black, palpi with many black hairs but beneath there are a number of pale yellow ones; thorax brown pollinose, sides with white hairs, dorsum with many short black hairs anteriorly and rather long white hair and black bristles posteriorly; legs in large part reddish brown with white hair and black bristles, anterior side of each femur largely black; wings nearly uniformly pale brownish, hardly as dark as in *bastardii*, gray shadow in the first submarginal cell plainly evident and with distinct limits, about a third as wide as the cell at the widest place. Abdomen brown pollinose on the venter and sides, black dorsally, uniformly clothed all over with short white hair, no black hair except a few black bristles on either side of the first segment. The hypopygium is furnished with silvery hair above very much as in *albifacies*.

The most apparent difference between this and related species is the uniform distribution of rather short white hair over the abdomen and the absence of black hair except the black bristles on the sides of the first segment.

Several specimens from the Huachuca Mountains, Arizona. Besides the species has been reported from several places in Mexico.

***Promachus nigripes* n. sp.**

Total length 28 to 32 millimeters. Mystax and beard white, rear of the eyes with white hair, occipito-orbital bristles largely black, palpi black with numerous black hairs and a few white ones on the lower side, antennae black. Thorax gray pollinose, mesothoracic dorsum with the usual markings not conspicuous, clothed largely with black hair and bristles, sides of the thorax with long gray hairs, scutellum with black hair and bristles; legs black, mainly with black hair and bristles, but there may be some white hairs especially on the femora; wings hyaline, no gray shadow in the first submarginal cell. Abdomen from above banded with black and white, a white pollinose band clothed with white hair on the posterior part of each segment and a wider black band clothed with black hair before it, venter and sides white

pollinose with white hairs. Hypopygium rather wide and clothed above with silvery hair, posterior ventral margin of the eighth segment with black and white hairs.

There is some variation among the different specimens. The hair on the posterior part of the mesothorax may be largely white, the legs may vary in the extent of the white or black hair present, although the bristles are always black, and in the male the margin of the eighth ventral segment may be furnished entirely with black hairs.

The distinct limitation of the black and white areas on the dorsum of the abdomen so as to form bands, together with the entirely black legs characterize the species.

The male type and seven other males and females taken at Albuquerque, New Mexico, by J. R. Watson.

***Promachus aldrichii* n. sp.**

Total length 28 to 30 millimeters. Mystax and beard white, occipito-orbital bristles mostly black, palpi black with white hairs, only a few black ones above. Dorsum of the mesothorax mainly with black hairs, and bristles, but there is some rather long white hair on the scutellum and before it, prothorax gray pollinose, usual markings present but they are not very plainly shown; legs black, clothed with black and white hair and black bristles; wings clear hyaline, no shadow in the first submarginal cell; abdomen black in ground color, gray pollinose on the sides and venter and clothed everywhere with rather short hair which is almost all white, there being only a very few short black hairs on the anterior dorsal part of each segment. In the male the posterior ventral margin of the eighth abdominal segment is furnished with a fringe of white hairs and the hypopygium is silvery pilose above.

The most characteristic thing about the species is the uniform distribution of the white hairs on the abdomen so that this part does not appear evenly banded as in *nigripes*.

The male type and one female from Utah, and received from J. M. Aldrich of Moscow, Idaho.

***Promachus minusculus* n. sp.**

Total length 24 to 26 millimeters. Mystax and beard pure white, palpi black with some black and some white hairs, occipito-orbital bristles largely pale although there are always a few black ones intermixed. Thorax gray pollinose, thoracic dorsum with the markings not very distinct, clothed with black and white hair and black bristles, bristles of the scutellum partly white and partly black, wings pure hyaline, veins brown. Legs dark reddish in general coloration, femora darkest anteriorly, tibiae red, tarsi nearly black, all the parts clothed with reclining white hairs and black bristles. Abdomen rather dull black in general coloration, venter, sides and posterior part of the dor-

sum of each segment clothed with white hairs, anterior part of the dorsum for more than half the length of each segment clothed with black hairs. Hypopygium small and clothed both above and below with rather long silvery white hair, ovipositor black.

Easily known from other species of its group by its small size and general rather light color as well as by the very small hypopygium which is densely clothed with silvery hairs below as well as above.

Male type and five other males and females taken near Albuquerque, New Mexico, by J. R. Watson.

***Promachus giganteus* n. sp.**

Total length, male 37, female 41, millimeters. Mystax and beard white, hair of the rear of the head white, occipito-orbital bristles mostly black, palpi black, largely with white hairs, but there are some black ones above, antennae black; general color of the thorax reddish brown, mesothoracic dorsum with a rather wide middorsal black stripe which is divided lengthwise by a narrow red interval, on either side is a second black area which is divided by a narrow red space which follows the transverse suture. As the surface of the dorsum of the mesothorax is somewhat denuded in the specimens studied it is likely that the markings described are plainer than would be the case otherwise, scutellum clothed with white hair and with two rows of black bristles near the margin; legs in large part dull reddish and clothed with black bristles and recumbent white hair, tarsi nearly black, femora darkened anteriorly; wings hyaline, no gray shadow in the first submarginal cell, veins brown and some of them towards the apex very narrowly margined with a nearly obsolete brownish shade. Abdomen as seen from above alternately banded with black and white, the former color usually wider than the latter. The black and white is segmentally arranged, the anterior part of each segment is black with black hair and the posterior part is white pollinose with white hair, sides and venter of the abdomen corresponds in color with the posterior parts of the segments. In the male the hypopygium is silvery pilose above and the posterior ventral margin of the eighth abdominal segment is furnished with a thickly placed row of white hairs.

The species cannot be mistaken among described North American species on account of its very large size.

The type female and one male taken at El Paso, Texas, by D. L. Crawford, and received from Carl F. Baker, of Pomona College, Claremont, California.